Soil Conservation

July 1977

U.S. Department of Agriculture

Putting Water in Its Place 11

The Wild, the Tough, and the Beautiful 14

Big Show on Little Waters 18

From the Administrator

Irrigation Without Waste

Drought has increased demand in many parts of the country this year for SCS technical help in designing and improving irrigation systems.

The Service recognizes its responsibility for giving irrigators the assistance they need to attain efficient and productive systems. We also recognize our responsibility to the public for keeping the waste of water to a minimum and for protecting water quality.

The amount of improvement that could be made in reducing waste in irrigation systems is enormous. Agriculture accounts for more than 80 percent of the Nation's water consumption today. If irrigation waste could be cut even 5 or 10 percent, it would represent a significant volume of water available for other uses.

There are many ways to reduce waste of irrigation water. Irrigate only as often as crops need it. There is a right rate and time to fit each crop and soil.

Keep ditches clean and line them to reduce seepage. Level fields. Install pumpback systems to reuse tailwater. Use shorter runs for furrow irrigation. Plan a system using efficient sprinkler or drip irrigation.

It is also possible to help protect water quality. In the Wellton-Mohawk area of Arizona, SCS is conducting an onfarm irrigation improvement project that is expected by 1981 to cut the Colorado River's annual salt load by half a million tons.

It's important for Service people and districts to keep in mind that when a farmer seeks irrigation assistance, he is concerned primarily with higher crop production. It is our job to remind him that water conservation is also a concern, and that any assistance provided him by the Service must be consistent with that concern.

Mel Davis

July 1977, Vol. 42, No. 12

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Secretary of Agriculture

R. M. Davis, Administrator
Soil Conservation Service

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Cover:
The biggest single use of water in this country is irrigation and one of the biggest water conservation needs is improved water management techniques. See page 11. (Photo, Donald C. Schuhart.)

Soil Conservation

Contents

From the Administrator 2

PMC's: Where Are They? 4

The Search for "Workhorse" Plants 5
Robert S. MacLauchlan

Plants to Do a Job 10

Putting Water in Its Place 11

Wildflowers: Beautiful but Tough 14
John A. Dickerson and Edith K. Hadle

Small Acreage Pays Big Dividends 16
Harold A. Woodward

Little Waters 18

Everybody's Lake 19
Frederick E. Bubb and Lowell W. Edminster

News Briefs 20

Severe Wind Erosion Hits Plains 22

Beaver Dams Help Peanut Farmers 23
F. Dwain Phillips and John I. Upton

Meetings 23

PMC's: Where Are They?

The plant materials center at Bridger, Mont., has irrigated land with trees and shrubs planted on the contour (foreground), grasses and legumes, and honeybee colonies (right foreground) for pollination.

Plant materials centers are located in selected plant growth regions of the United States. Their purpose is to meet the need for better conservation plants along roadsides, streambanks, and shorelines; in rolling or hilly country; in surface mined areas; in "problem" soils and climates; and for many other purposes.

The answer to most soil erosion and improper water management continues to be vegetation, and the right kind of vegetation can solve many conservation problems.

Eighteen plant materials centers are operated by the Soil Conservation Service and two by cooperating agencies. They are located in:

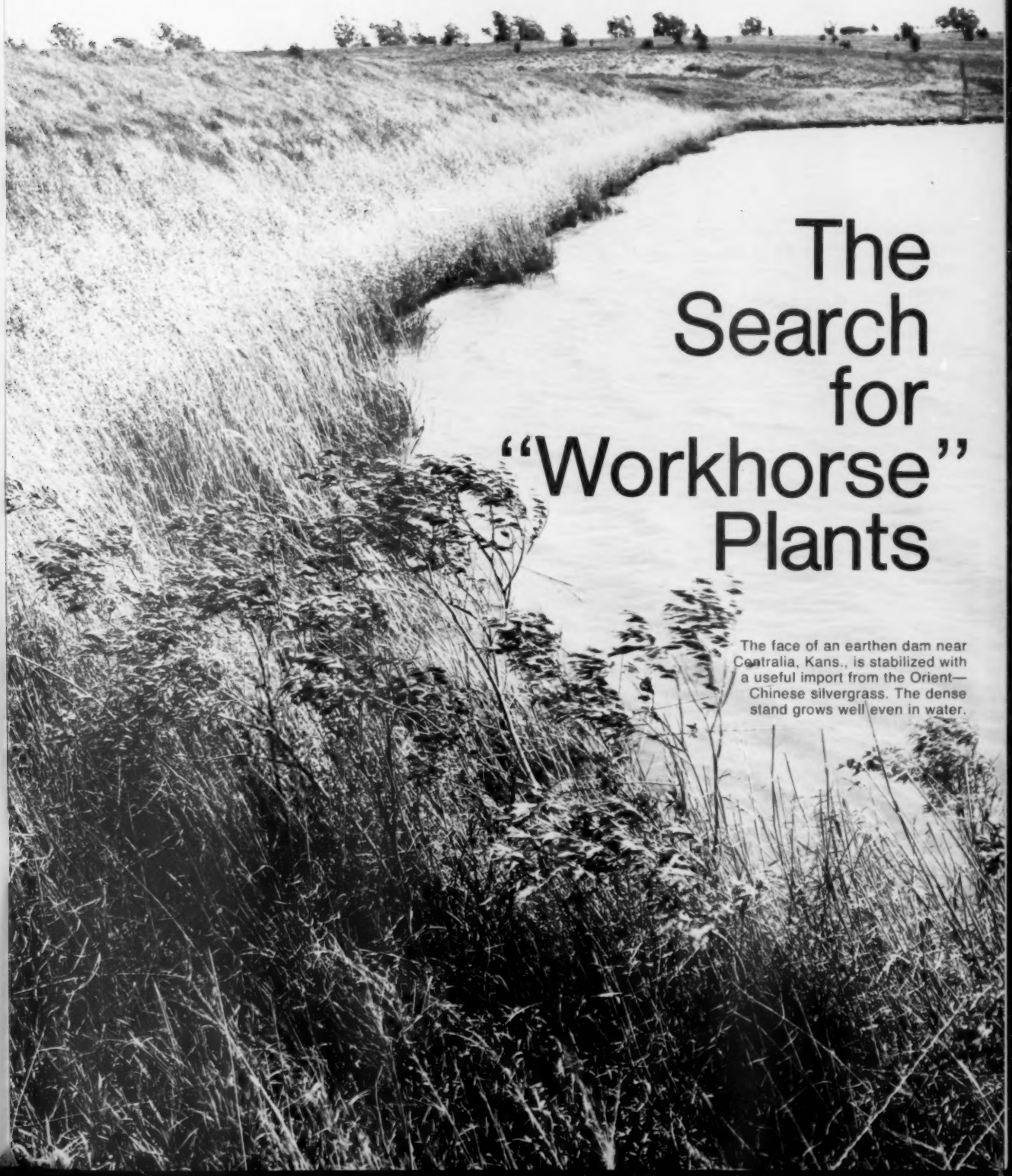
Tucson, Arizona
Lockeford, California
Brooksville, Florida
Americus, Georgia
Molokai, Hawaii
Aberdeen, Idaho
Manhattan, Kansas
Quicksand, Kentucky
Beltsville, Maryland
East Lansing, Michigan
Coffeeville, Mississippi
Elsberry, Missouri
Bridger, Montana
Cape May Courthouse, New Jersey
Big Flats, New York
Corvallis, Oregon
Knox City, Texas
Pullman, Washington
Los Lunas, New Mexico (operated by New Mexico State University)
Bismarck, North Dakota (operated by North Dakota Association of Soil Conservation Districts)

In addition, SCS provides technical help to a State-operated center at Palmer, Alaska, and to an environmental plant center at Meeker, Colo., operated by the White River and Douglas Creek Soil Conservation Districts.

by Robert S. MacLauchlan

SCS researchers look for the "tough guys" of the botanical world—plants that grow with little water or under water, plants that thrive in acid minespoil or sodic soil or salt.

The Search for "Workhorse" Plants



The face of an earthen dam near Centralia, Kans., is stabilized with a useful import from the Orient—Chinese silvergrass. The dense stand grows well even in water.

WANTED: In the West, low growing, drought-tolerant plants that will grow on manmade soils, like highway banks.

In the East, plants that will thrive in surface minespoil high in sulphuric acid.

Around oil wells and in the irrigated West, productive plants to grow in soils high in salt.

In the South, plants to control gullies without becoming pests like kudzu.

A search for plants to perform these and many other "workhorse" jobs is going on at the 20 plant materials centers (PMC) of the Soil Conservation Service.

While most plant explorers look for improved food and fiber plants or more beautiful garden varieties, SCS researchers look for plants that will prevent soil erosion. They may or may not be attractive; they may or may not have commercial value to the farmer. But SCS insists that they help keep soil from washing or blowing away.

Each plant materials center receives, tests, and selects promising varieties from among thousands of candidates. A center does not sell plants and seed, but instead releases its selections to commercial nurseries and seed producers. In so doing, a center works closely with other Federal and State agencies, with commercial firms, and with seed associations.

More than 120 conservation plants released by SCS centers are in widespread use today, fighting a variety of erosion battles from shorelines to mountaintops. Typically, SCS releases five new selections a year. These are made available by growers to farmers and ranchers, highway landscapers, wildlife specialists, and many others who use the land.

A typical center search is highly systematic. The Cape May, N.J., PMC, for example, in the 1960's began testing every American beachgrass it could find for its ability to stabilize sand dunes. A strain discovered on Cape Cod in 1965 proved superior, and after extensive testing in cooperation with Rutgers University, it was made available to commercial nurseries in 1972. Named 'Cape' American beachgrass, it is now widely available for use from Maine through North Carolina.

The Cape May PMC then began searching for plants to prevent beach erosion between the dunes and the sea, even in the area inundated twice daily by tides. Today the search has narrowed to several collections of saltmeadow and smooth cordgrass. One variety, it is hoped, will be found to grow well in the tidal strip; another, just above the normal high tide mark, where waves may lash the area during storms or high winds.

At present, Cape May scientists are testing more than 100 cordgrass strains collected from Maine to the Gulf Coast. They are growing in salt water basins at the New Jersey center.

In all, some 16,000 foreign and domestic plant collections are being evaluated at any one time at the Service's centers. There may be as many as 9,000 comparative test plantings going on, including such rigorous trials as putting rock salt around pine seedlings to simulate coastal conditions or increasing acidity drastically to resemble surface minespoil.

Varieties for testing may come from anywhere in the world. Many domestic

More than 120 conservation plants released by SCS centers are in widespread use today, fighting a variety of erosion battles from shorelines to mountaintops.

At left, a commercial grower near Jackson, Wyo., produces seed of 'Greenar' intermediate wheatgrass, an import from the U.S.S.R. selected at the PMC at Pullman, Wash. The plant is widely adapted for conservation use on well-drained soils in dryland and irrigated areas.

At right, first used for erosion control on Corn Belt highway banks, 'Emerald' crownvetch also stands up well under sustained grazing when used as a pasture legume. It grows well in shallow soils where grasses grow poorly.

plants are sent in by SCS field employees in response to "wanted" circulars from the centers. One of three wildflowers released last year for erosion control in the Great Plains—'Eureka' thickspike gayfeather—was spotted by Leo Brown, SCS technician at Eureka, Kans. He watched the small clump of plants off and on all summer, and, in the fall, mailed a tiny handful of seeds to the Manhattan, Kans., PMC. It was planted in rows with other seeds collected. Eventually, it was declared the superior strain and released to commercial growers.

Other selections have more exotic histories. 'Pink Lady' winterberry, a large shrub useful for the inside row of farmstead windbreaks and for wildlife food and cover, was taken in 1924 from a stone wall in the old section of Peking, China. The man who noticed it was USDA plant explorer P. H. Dorsett, remembered chiefly for bringing back thousands of soybean varieties from the C.ient.

While many native grasses have been returned to the American rangeland, some of the more important wheatgrasses have come from overseas. For example, 'Luna' pubescent wheatgrass was collected by the Westover-Enlow expedition to the USSR and Turkey in 1934 and selected and increased in New Mexico. 'Latar' orchardgrass, one of the most successful imports, was introduced from the Institute of Plant

Registered Hereford bulls dine on 'Lana' vetch in bloom. The SCS import from Turkey is popular in California today.

Some selections have exotic histories: 'Pink Lady' winterberry was taken in 1924 from a stone wall in the old section of Peking, China, by a USDA plant explorer.

'Cardinal' autumn olive is a favorite of wildlife for its appetizing fruit.

Below, a crewman plants 'Arnot' bristly locust on coal minespoil in West Virginia. The spoil has a slope of 60 percent and is very unstable, but most of the locust should make the grade.

Above, dense stand of 'Streamco' purpleosier willow protects northern streambanks from ice and water erosion.

At left, another import from Turkey, 'Tegmar' dwarf intermediate wheatgrass, is used to seed diversions and waterways in the West. It forms an excellent sod, controls erosion, and requires little maintenance.

'Cardinal' autumn olive also grows well in surface minespoil. Other cover includes Kentucky 31 tall fescue and 'Viking' birdsfoot trefoil.

Industry in Leningrad and tested for many years in Washington State. 'Latar' proved the lowest among seven orchardgrasses in lignin and the highest in digestibility by livestock. Today it is available in quantity and used increasingly by western ranchers.

A few imports are "old Americans," but their value for conservation has gone unappreciated until recently. An example is purpleosier willow, brought by settlers from Europe in colonial days for making baskets. It got the name "basket willow."

Today it is a favorite of conservationists for its ability to prevent erosion of northeastern streambanks, particularly in the spring, when melting ice and snow increase streamflow and chunks of ice gouge out unprotected banks.

The value of purpleosier willow as a streambank buffer was observed along the Winooski River some 40 years ago by an SCS biologist in Vermont. Years of testing followed, proving that cuttings of one variety of the plant became established quickly. When planted with grass mixtures and legumes, it provided effective protection for streambanks within 2 years after planting. It suckered profusely from roots, forming a dense thicket. Ice floes can slide over the resilient plant stems without damaging them.

Today the remarkable plant is available from commercial nurseries under the name 'Streamco' purpleosier willow. It should prove useful in New England States, New York, Pennsylvania, Michigan, and possibly other locations.

In several centers, a determined search has been going on for 30 years for plants with the ability to reclaim surface-mined lands. More than 2 million acres of such lands need reclamation, but the soils are often inhospitable to plant life. In the East, coal minespoils are frequently high in acid and low in fertility. Even so, several plants already have been selected and released by SCS that will survive in difficult minespoils and banks.

One of the most successful is 'Arnot' bristly locust, a native from the hills of Appalachia. Collected in 1958, it was released in 1969. It is a thicket-forming shrub, adaptable to all eastern coal mining areas, with the ability to cover even very acid spoils quickly. It spreads fastest, in fact, in barren areas where there is little or no competition from other vegetation. It is in wide use today.

Another good plant for reclamation is 'Cardinal' autumn olive, which will survive under a variety of minespoil conditions. It is outstanding for its early and vigorous growth and exceptional cover-producing qualities. And because of its nitrogen-fixing ability, it has a beneficial effect on species planted adjacent to it.

The fruit of 'Cardinal' autumn olive is also a favorite of wildlife.

One of the newest releases is 'Tioga' deertongue, a native warm-season bunchgrass that grows very well in acid minespoil and has excellent drought tolerance. It was selected at the Big Flats, N.Y., PMC.

In western surface mines, acidity is much less of a problem. Bigger problems are the low rainfall and soil fertility. The center at Bridger, Mont., has already released four plants with good growth qualities.

As surface mining has become increasingly important in the West, two districts in Colorado have opened a center at Meeker to develop "environmental plant materials" aimed at reducing erosion at mine sites and speeding reclamation. Center specialists will work closely with mine company reclamation experts.

Plant materials specialists, who include many scientific disciplines in their ranks, are convinced that somewhere in the world a plant exists to help solve practically every conservation problem.

Mr. MacLauchlan is chief plant materials specialist, SCS, Washington, D.C.

A determined search has been going on for 30 years for plants able to reclaim surface-mined lands. Today, several varieties are transforming minespoil areas.

Plants to Do a Job

The following are a few of the conservation plants released by SCS and its cooperators to commercial nurseries and seed growers. These conservation "winners" are selected from among thousands of contenders as the best for stopping soil erosion.

•'Zorro' annual fescue—early maturing, self-reseeding annual used for roadside stabilization, critical area stabilization, and cover crops in low rainfall areas of California.

•'Corto' Australian saltbush—a drought and alkali tolerant plant useful in critical area stabilization, including roadbanks, ditchbanks, and minespoils in the 10- to 12-inch rainfall areas of the Southwest.

•'Kalo' dwarf English trefoil—useful for roadside and critical area stabilization (and beautification) in western Oregon and Washington.

•'Lathco' flatpea—useful in critical area stabilization and beautification from West Virginia to Maine. Used on logging roads, gravel pits, utility rights-of-way, roadbanks, dams, borrow areas, and minespoils. Also a valuable wildlife food and cover plant.

•'Bobwhite' wild soybean—self-reseeding; valuable in game bird food patch management in the southern Corn Belt.

•'Wytana' fourwing saltbush—perennial shrub easily established from direct planting of the seed. Valuable for mine land reclamation and range revegetation in Montana and Wyoming. Protein content remains high during winter, making it valuable for wildlife.

•'Midwest' Manchurian crabapple—adapted from Montana to Michigan and as far south as Kansas and Missouri. It is an excellent plant for farmstead windbreaks, wildlife plantings, and beautification. Retains fruit all winter, making it an excellent winter food source for songbirds.

•'Marshfield' big trefoil—valuable pasture legume for poorly drained soils for use west of the Cascade Mountains. It is also used for deer and elk feed and to stabilize logging roads.

•'Rem-red' honeysuckle—multiple-use shrub adapted from Massachusetts to South Carolina and westward through Missouri. Fruit is very persistent and is available to birds during the winter.

•'Goshen' prairie sandreed—a rhizomatous, warm-season perennial grass adapted to sandy sites receiving more than 12 inches of precipitation in eastern Montana, eastern Wyoming, western Nebraska and northeastern Colorado. Used for stabilization and range revegetation on sandy sites.

•'Emerald Sea' shore juniper—a low-growing spreading shrub used for stabilizing and beautifying coastal sands subject to salt sprays.

•'Rosana' western wheatgrass—native grass for range revegetation, critical area stabilization and mined land reclamation in Montana, Wyoming, and Colorado.

•'Halifax' maidencane—selected specifically for protecting the shores of reservoirs from erosion by waves and for stabilizing the toe slopes of channels and small streams in Arkansas, Louisiana, and Mississippi.

•'Cave-In-Rock' switchgrass—warm-season native perennial grass selected specifically to provide summer pasture in southern Corn Belt.

•'Critana' thickspike wheatgrass—excellent for stabilizing disturbed areas, such as roadsides, airports, mined lands, and construction sites, in Montana and Wyoming. Produces a tight sod under dry land conditions.

•'Garrison' creeping foxtail—widely used throughout the northern States as a productive pasture grass in permanently wet areas.

•'Kleingrass 75'—used extensively for soil protection and pasture and rangeland improvement in Texas.

Better systems and improved management techniques are available for conserving water for irrigation, the biggest single use of water in the United States.

For most crops, SCS recommends irrigating when the plants have used not more than half the moisture that is stored in the soil. If fields are allowed to dry out, plant quality and production may suffer.

Putting Water in Its Place

Watering crops sounds simple enough—until you try it.

Too much water and you can raise the water table, drown plants, erode the land, and deposit silt on fields.

Too little water and the whole effort is wasted.

Irrigation is by far the biggest single use of water in the United States—accounting for more than 100 billion gallons of water daily. Much of this water never reaches its destination. It seeps through unlined irrigation ditches, evaporates, or runs off the land. Although seepage and runoff water may flow back into rivers to be used downstream, its quality may have deteriorated because it has picked up salt and chemicals from the soil.

"One of the biggest needs in conserving irrigation water is improved management techniques," says Carl L. Anderson, the Soil Conservation Service's water management engineer for irrigation. "This means determining how much water to apply, when, and how."

Because extra water is needed to leach salt accumulations out of the root zone, 100 percent efficiency in irrigation isn't practical or even desirable. But SCS estimates that 70 to 75 percent overall efficiency is a reasonable target for most systems. The national average is estimated to be only 41 percent.

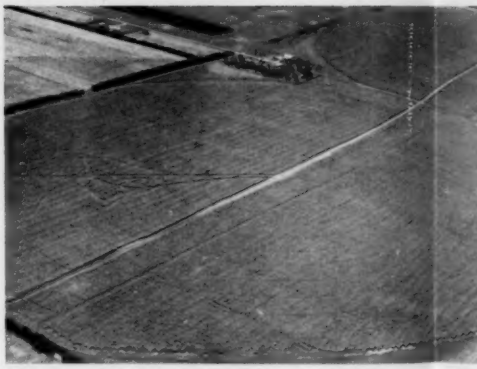
"The recent drought makes us all more conscious of the need to conserve water," Anderson said.

SCS provides onfarm technical assistance in developing irrigation systems and is stepping up assistance in operating and maintaining the systems.

Pasture and hay account for more than a third of the irrigated land in the West. After irrigation, livestock should be kept out of a pasture for several days to allow the soil to dry out and prevent compaction.

Surface irrigation systems often produce excess runoff water. This tailwater recovery system catches runoff and pumps it back over the crop. About 2,000 such systems are installed each year with technical assistance from SCS.

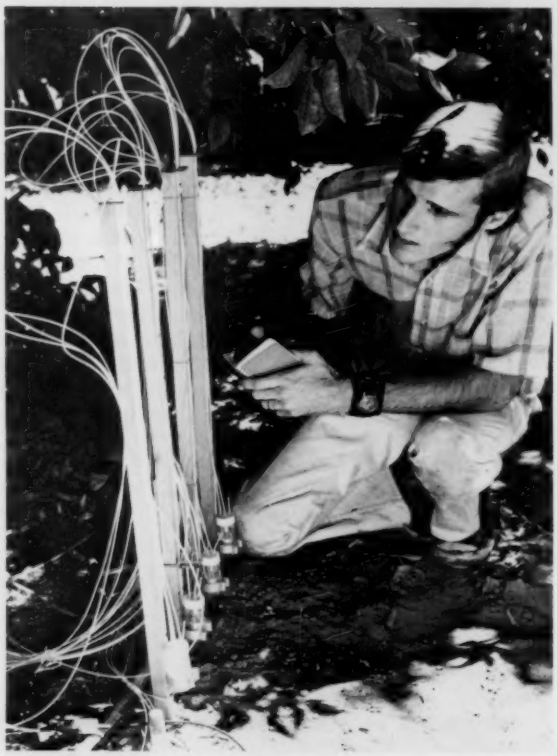
SCS uses soil surveys and onsite tests to help irrigators plan water management. In a furrow irrigated field, an SCS technician determines intake rate. Using a Parshall flume, he measures the flow near the supply ditch and again farther down the row. The difference in flow is the amount of water absorbed by the soil.



Center pivot systems, which normally irrigate 125 acres at a time with a single self-propelled unit, may require adjustments in other conservation measures. To make room for the pivot, for example, windbreaks may need to be relocated.

Before a farmer or rancher can irrigate simply according to his wristwatch, he must know the flow rate of his water supply, the water intake rate and holding capacity of his soil, the slope of his field, and the root depth and daily water consumption of his crop.

Slope can be altered for better water management. Parallel benches break up a long slope and are leveled for efficient water application. Underground pipes provide irrigation water to the benches.



Solidset sprinkler systems, such as this permanent overhead system in a Florida citrus grove, are designed according to the same soil and crop factors critical to flood and furrow irrigation. More than half of the irrigated land in the East is in fruits and vegetables.

California researchers use tensiometers (detail at far left) to determine moisture and salt movement in drip irrigation systems. How often to irrigate depends on how much water the soil can hold and how much moisture is already in the soil.

Royal lavender flowers of 'Eureka' thickspike gayfeather will be brightening roadsides in eastern Kansas and Nebraska within a few years.

Wildflowers: Beautiful but Tough

by John A. Dickerson
and Edith K. Hadle

Most Americans think of the Great Plains as a region of native grassland, and for a long time plant scientists shared that conception. Recently, however, they have been studying the contribution that native wildflowers can make in the Plains States to conservation, forage, and beauty.

One of the major investigations is taking place at the SCS plant materials center at Manhattan, Kans., in cooperation with the Nebraska Horticulture Department and the Nebraska and Kansas Agricultural Experiment Stations.

Objectives of the investigation are to:

- determine which wildflowers are useful and under what conditions;
- learn how to produce quantities of seed;
- find out how to harvest, clean, and store seed;
- establish seeding rates in mixtures with grasses;

Native forbs are making a comeback as the result of an interagency investigation to learn more about using wildflowers to solve a variety of conservation problems.

At the plant materials center in Manhattan, Kans., wildflowers and other promising conservation plants are assembled, compared, and evaluated. Proven plant materials are increased and released to growers.

Maximilian sunflower, shown before blooming, will be useful for range seedings and critical area and wildlife plantings.

• determine the value of wildflowers to livestock and wildlife; and

• establish procedures for releasing varieties and testing seed with crop improvement associations and the Association of Seed Certifying Agencies.

The quest for "good" wildflowers, or "forbs," as scientists call any herb which is not a grass or grasslike, has turned up several winners. Released early last year to growers were 'Kaneb' purple prairieclover, a native legume that fixes nitrogen into soils with depleted fertility; 'Eureka' thickspike gayfeather, a tall plant with lavender flowers that beautifies highway corridors; and 'Nekan' pitcher sage, that strengthens grazing lands and furnishes food for wildlife. (See "Prairie Wildflowers on the Horizon," September 1976 *Soil Conservation.)* All three will be available in quantity after the 1978 harvest.

Another forb, released in New Mexico, is 'Bandera' rocky mountain penstemon, available now for erosion control in more arid regions. The attractive plant is suitable for roadside and other critical erosion plantings.

The wildflowers will not only spread a carpet of color across the Plains but will also keep soil in place, furnish livestock forage, and frequently provide food and cover for wildlife. Wildlife also is more abundant in grass stands containing wildflowers.

More wildflower species are undergoing comparative tests at the Kansas center. Those with potential for range forage include Maximilian sunflower, Engelmanndaisy, and compassplant. Promising erosion control forbs include bushsunflower, sunflower heliopsis, grayhead prairieconeflower, and roundhead lespedeza. All will help build wildlife populations.

Problems of harvesting and cleaning seed already have been solved for most of these wildflowers. Most recently, butterfly milkweed, which produces light windborne seeds, was harvested successfully using a combine. Now studies are under way to learn more about growing the flowers in solid, seed-producing stands.

Testing of seed mixtures of forbs and grasses is continuing at the center and the University of Nebraska, and work on a Kansas State University masters thesis funded by the Kansas Forestry, Fish, and Game Commission at the center has helped determine the value of forbs to nongame bird habitat.

Mr. Dickerson is manager, Manhattan Plant Materials Center, SCS, Manhattan, Kans.
Ms. Hadle is a biological technician, SCS, Manhattan, Kans.

In northern Kentucky, a dairy farmer relies heavily on conservation measures to maintain high production on his small family farm.

Small Acreage Pays Big Dividends

by Harold A. Woodward

Charlie Snapp and his family have been recognized as "Master Conservationists."

Tell Charlie Snapp of Cynthiana, Ky., that the small farmer is on the way out, and he'll laugh at you. Dairymen with twice the land would admire Snapp's 16,000-pounds-plus production record, his efficient operations, and his "showplace" soil conservation program. Most people are surprised when they learn that Snapp is doing all this with 87 Holsteins on a 103-acre farm.

"We reached the point where we had to get in or get out," Snapp says. "If we were to continue to survive and make a living on a family farm, we had to play hard ball."

"Hard ball," according to Snapp, includes top-quality cows, soil conservation (including recycling wastes), a topflight feeding program (including "incentive feeding" of high-producing cows), and using all possible help from government agricultural agencies.

Most of Snapp's dairy herd has been raised on his farm. He has a small calf barn equipped with forced-air ventilation and provision for either liquid or dry feed, depending on the age of the animals. Snapp says that by raising calves from known high producers he has been able to build a top-quality herd.

He uses pelletized feed mixed with corn silage. The corn is raised on the farm and stored in three bunker silos holding a total of 631 tons.

Recently Snapp installed a magnetically operated feeder that allows a cow to receive a pound of feed each time she places her head in the feedbin. When a cow's daily production reaches 60 pounds, a magnet is placed around her neck to activate the feeder. The farmer says that after he began using this system, the rolling herd average increased 1,300 pounds during a 6-month period.

An intensive farm operation such as this places unusual demands on the land. Snapp has had to rely heavily on conservation measures to maintain production. As a cooperator with the Harrison County Conservation District (CD), using the technical assistance of the Soil Conservation Service, he has constructed 1,300 feet of diversion channels and 12,000 feet of terraces that empty into 2 acres of grassed waterways.

A holding pond traps wastewater from the milk parlor and wastes that leach through the manure storage area. The wastes are recycled through an irrigation system onto 3.5 acres of tobacco and 45 acres of corn.

"My conservation program has been a godsend," Snapp says. "Without it, my farm would have been in the Mississippi Delta long ago."

Snapp uses the services of all the agricultural agencies in Harrison County to carry out his "rapid adjustment" program. Plans for his motel-type barn, plus money for expansion and for performing conservation practices, came as a result of close liaison with these agencies.

What do Snapp and his family get from all this hard work?

Recognition, perhaps, because they have been honored with a Master Conservationists Award by the Harrison County CD. A good living, maybe, because they do enjoy a comparatively high standard of living. But the benefits the Snapps receive are more than tangible things—the rewards of living, playing, and working together and keeping alive the principles of the family farm.

So, if you think the small landowner is on the way out, ask the Snapp family. They'll set you straight.

Mr. Woodward is visual information specialist, SCS, Lexington, Ky.

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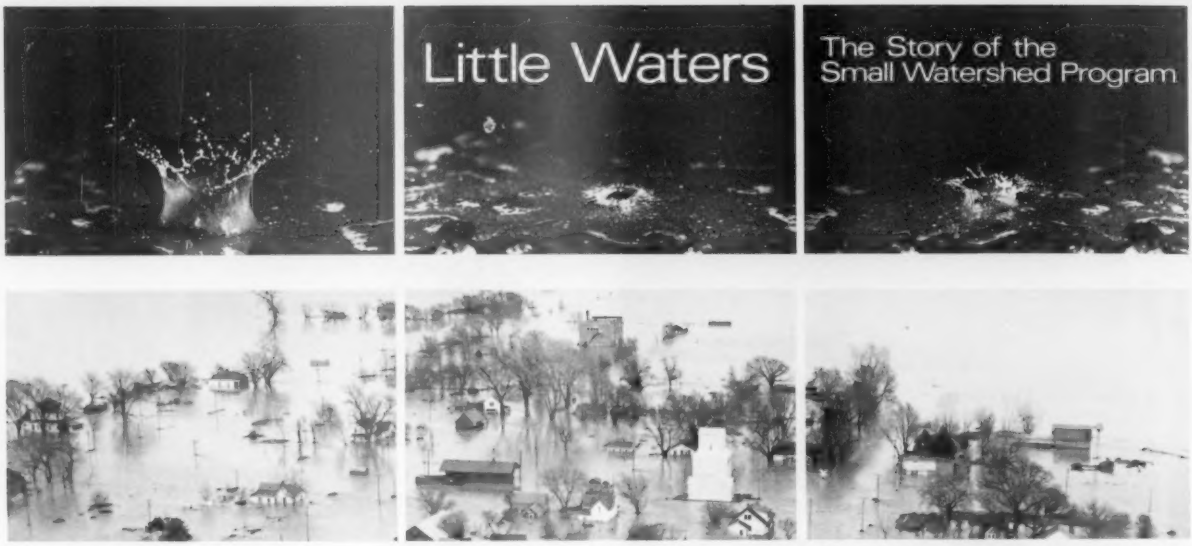
Snapp uses incentive feeding of high-producing cows. He places a magnet around the cow's neck which activates the feeder each time she places her head in the feedbin.

He uses pelletized feed mixed with corn silage. The silage is stored in three bunker silos and carried by end loader to portable feeding bins.

Snapp plants corn for silage on terraced land and irrigates with recycled waste.



Typical damage caused by upstream flooding is one of many three-screen, panoramic views used in "Little Waters."

Pioneering conservationists cautioned that the needs of small rivers not be overlooked. The results of their concerns are reflected in a new multimedia presentation.

"Little Waters," a new 21-minute, three-screen multimedia production, tells the story of the small watershed program from its inception.

The title for the production and the introduction to the show were drawn from the Little Waters report presented to President Franklin D. Roosevelt in 1936 by the Soil Conservation Service, Resettlement Administration, and Rural Electrification Administration.

In transmitting the report to Congress, Roosevelt said, "We have grown accustomed to dealing with great rivers with their large problems of navigation, of power, and of flood control. And we have been tempted to forget the little rivers from which they come."

He pointed out that we can have no effective national policy in flood prevention until we trace this running water back to its ultimate sources and find means of controlling and using it.

The Little Waters report laid out a strong case for upstream conservation measures such as terracing, contouring, and stripcropping that would control erosion and help stormwater move more slowly off the land.

Thus the seed for the small watershed program was sown.

The multimedia show graphically shows the problems of the midthirties with upstream flooding and erosion. In fact, the year Roosevelt sent the Little Waters report to Congress, floods were among the worst on record in the northeast and Ohio and Mississippi Valleys; and Congress promptly passed the Omnibus Flood Control Act of 1936.

The three-screen presentation follows the upstream flood prevention work through the 11 authorized projects, the pilot watershed projects, and, finally, to Public Law 566 and the present time.

It points out that what makes PL 566 legislation unique is local involvement, and that local people are responsible for starting watershed projects, acting through their own organizations.

The show takes an indepth look at nine projects located in seven States from Virginia to California and tells how they drastically curbed flood and erosion damage and, through multiple-purpose aspects, enhanced the local economy.

The nine are among the 1,185 projects completed or under construction. Besides flood prevention, each of the nine has one or more other purposes, such as municipal and industrial water supply, irrigation, fish and wildlife development, or recreation.

The presentation acknowledges that critics of the program say it hasn't moved fast enough, that more communities need protection from damaging floods and erosion, and that more alternatives need to be explored.

But the accomplishments of the program far outweigh its shortcomings, and would astonish the authors of the Little Waters report.

The show was produced by the Soil Conservation Service's Information Division and utilizes six slide projectors, three dissolve units, and a digital programmer. Nearly 600 slides are shown in the presentation.

"Little Waters" was premiered at the National Watershed Congress in Washington, D.C., in June. It is scheduled for several showings at USDA's Jefferson Auditorium in Washington, D.C., and at the National Association of Conservation Districts Convention at Anaheim, Calif.

The handicapped find recreation facilities that meet their needs at this Pennsylvania park—built after careful planning, next to a Public Law 566 flood protection lake.

by Frederick E. Bubb
and Lowell W. Edminster

Everybody's Lake

Mauch Chunk (pronounced Maw-Chunk) Lake, with the 2,100-acre county park that surrounds it in eastern Pennsylvania, is truly everybody's recreation area. It was planned that way.

The 345-acre lake, the only impoundment in the Public Law 566 project in the Mauch Chunk Creek watershed, helps protect the town of Jim Thorpe from floods in the valley below. Since the dam was finished in the early 1970's, it already has saved the town from probable flooding during Hurricane Agnes and an even heavier rainfall in a 1973 storm.

Prior to construction, Carbon County purchased the land around the lake for a county park.

"From the start, we wanted the park to be accessible to all county residents and visitors," recalls Darlene Confer, director of the county recreation authority. "Regulations now require that federally assisted recreation areas be usable by the handicapped, but we were going to follow that course whether required or not. Perhaps we were more aware of the need than other people because of the handicapped people who work in county offices."

The Soil Conservation Service reviewed plans and designs for adequacy.

Features for the physically handicapped include gently sloping ramps leading to the water's edge; guardrails leading into the water to provide safe support for waders and swimmers; picnic tables with concrete aprons; special restroom facilities; and nearby parking.

While no count has been made of the handicapped using the park, many visit it each week. The Good Shepherd Home of Allentown, Pa., a physical rehabilitation center, provides regular visits for its patients.

There also is a special site, Camp Appletree, for the mentally handicapped, with 80 percent of the cost funded by the local chapter of the Pennsylvania Association of Retarded Children. Other organizations, like the American Legion, also contribute. The camp provides a day camp for 4 weeks in July for 35 children and young people.

Other groups served by the park are senior citizens, whose own organizations will develop a reserved park site, and young people's groups, like 4-H and Scouts, who also will have a hand in setting up and maintaining their own area.

Mauch Chunk Lake in Pennsylvania offers facilities for the handicapped such as guardrails and gently sloping ramps which lead into the water.

Mr. Bubb is public information officer, SCS, Harrisburg, Pa.
Mr. Edminster is district conservationist, SCS, Jim Thorpe, Pa.

News Briefs

Widespread Drought

Drought conditions earlier thought to be restricted to the West and Midwest also plagued States in the East and Southeast as the year progressed.

A supplemental drought appropriation bill signed by the President on May 4 made new loan and grant funds available to farmers, ranchers, and others in emergency drought impact areas in all of 12 States and in certain counties of 12 other States. The U.S. Department of Agriculture (USDA) administers the bulk of the $469 million program.

But by the week of July 4, counties in five other States—Alabama, Georgia, Florida, Indiana, and West Virginia—and one parish in Louisiana were designated eligible for the emergency program. Meanwhile, emergency conservation measure funds were being used in the Caribbean Area—Puerto Rico and the Virgin Islands—to cope with the drought.

Originally designated to apply for loans and grants were individuals and communities in all of California, Minnesota, Missouri, Montana, Nebraska, Nevada, North Dakota, Oklahoma, South Dakota, Utah, Wisconsin, and Wyoming; and in designated counties in Arizona, Arkansas, Colorado, Idaho, Illinois, Iowa, Kansas, Michigan, New Mexico, Oregon, Texas, and Washington.

By mid-July,1,699 counties in 30 States had been designated eligible to receive funds for measures to cope with what some believe is the driest year of the century. The prospect, moreover, is for still other States to be added to the growing list of drought-plagued areas.

The Soil Conservation Service, under the $100 million Drought-Flood Conservation Program administered by the Agricultural Stabilization and Conservation Service, is providing technical assistance to emergency drought areas.

Before the passage of the drought bill, SCS had already accelerated its assistance, through local conservation districts, to farmers, ranchers, and local governments in drought-stricken areas.

Drought emergency funds included $150 million in 5-percent loans and $75 million in grants available through USDA's Farmers Home Administration to local governments for restoring or protecting community water supplies. Funds totaling $144 million were made available through the U.S. Department of the Interior.

All emergency drought funds must be committed by September 30, 1977, and all funded projects must be completed by November 30, 1977.

Land Judging Contest

It is one of the greatest outdoor classrooms of all. No wonder it is called the "World Series" of land judging.

The 26th annual International Land, Pasture, and Range Judging Contest, held this past May in Oklahoma City, Okla., drew 700 contestants from 32 States, from Vermont to Hawaii.

For the first time in recent years, there was no rain during the school and contest, traditionally set up and judged by the Soil Conservation Service staff in Oklahoma. A new feature, the homesite evaluation category, was first used last year and was also included in this year's competition.

Stations KTVY and WKY (radio) of Oklahoma City sponsored the contest.

Teams made up of four contestants each applied their knowledge and skills as they examined slope, soil, and plants. International 4-H and Future Farmers of America (FFA) team champions each received a trophy, medals, and $100; reserve champions, each a trophy, medals, and $75; and individuals, each a trophy, medals, and $50 or $25.

The winners were: 4-H team, Richmond, Ky.; FFA team, North Loup Scotia, Nebr.; 4-H individual, Steve Whittaker, Tyner, Ky.; FFA individual, Dennis Wells, Hoyt, Kans.

Winners in the pasture and range category were: 4-H team, Binger, Okla.; FFA team, Muskogee, Okla.; 4-H individual, Kelly Battles, Hobart, Okla.; FFA individual, Lonnie Daugherty, Muskogee, Okla.; and adult, Kendall Brashears, Ninnekah, Okla.

Walking off with the prizes in homesite evaluation were: 4-H team, Shelbyville, Ind.; FFA team, Comeaux High, La.; 4-H individual, Alan Lloyd, Charles Town, W. Va.; FFA individual, Mike Polley, Prairie View, Kans.; and adult, Larry Watson, Mannington, W. Va.

Conservation in El Salvador

Several conservation practices are being introduced on a "trial" farm in Santa Cruz Analquito in tropical El Salvador.

The Ministry of Agriculture organized the project to conserve resources and increase food production. The United Nations Development Program and Food and Agriculture Organization provided technical assistance.

Bank terracing, terraces for fruit and vegetable plantings, convertible miniterraces, and hillside canals are among the practices installed. All are well suited to the country's terrain of mountains and upland plains where coffee has been the major crop.

An agricultural research team from Taiwan gave onsite assistance to this smallest (8,260 sq. mi.) and most densely populated (over 4 million) of the six Central American countries.

The project marks the beginning of a national conservation program for El Salvador.

Farming Costs Up

It cost the Nation's farmers 9 percent more in 1976 than in 1975 to produce agricultural commodities, according to the USDA's Statistical Reporting Service (SRS).

Feed purchases claimed the largest share of production expenditures: $14.1 billion or 15.8 percent of the total, compared with 15 percent in 1975. Rents also were up; so were wage and contract labor expenditures, from $6.3 billion or 7.7 percent of the total in 1975 to $7.4 billion or 8.3 percent in 1976.

Fertilizer, lime, and soil conditioners took fourth place in expenditures, costing $7.2 billion, up from the $6.8 billion recorded in 1975, even though the percentage of total expenditures moved down from 8.3 to 8.1 from 1975 to 1976.

Fuel costs advanced in 1976, accounting for $5.2 billion or more than 5.9 percent, compared with 5.5 percent of the total expenditures in 1975.

These data are included in the annual summary, "Farm Production Expenditures for 1976," in which SRS summarizes 16 categories of farm production expenditures. For 1976, seven of these took larger portions of the total dollar outlay than the year before; eight showed declines; and one was unchanged.

Financial Squeeze on Western Farmers

The financial condition of many farmers in nine States west of the Mississippi has been deteriorating, reports the USDA's Economic Research Service (ERS).

Reports of farmers having financial problems caused by drought and low wheat and cattle prices brought concern over conditions in the area.

ERS conducted a special survey among 400 bankers selected randomly in Colorado, Kansas, Minnesota, Montana, Nebraska, North Dakota, Oklahoma, South Dakota, and Texas.

These States combined have one-quarter or 685,000 of the Nation's farms, and these account for about 27 percent of the U.S. total farm receipts.

Income and credit appear to be major problems for one-third or 73,000 of the farmers in the area borrowing from banks. Farmers in Nebraska, Kansas, and Oklahoma—where the major industries are livestock and wheat—were the hardest hit financially.

The bankers expect more than one-fourth or about 59,000 farmers in the nine-State area to be forced to refinance their loans or dispose of some farm assets to meet their debt payments. Another 14,000 farmers, or 6 percent, will not be able to repay their debts with expected income, according to the survey.

Total dollar volume of bank loans in the area rose 17 percent from March 31, 1976, to March 31, 1977, and agricultural loans not secured by real estate rose by 19 percent. But total deposits increased only 11 percent in the same period.

The farmers' serious financial problems, if prolonged, could have an equally severe impact on rural communities in the area. Reduced income to merchants could mean reduced employment. Land values and taxes could fall and communities could be forced to cut services.

National Wetlands Inventory

The Soil Conservation Service is assisting the U.S. Department of the Interior's Fish and Wildlife Service to conduct the first comprehensive inventory of the Nation's wetlands since 1954.

William B. "Blake" Parker, assistant State soil scientist for Mississippi, is representing USDA on the National Wetlands Inventory staff at St. Petersburg, Fla.

SCS soil scientists also are helping to develop a new classification system for the survey, which will include all 50 States and the territories.

The new system is being designed to provide data to wildlife managers, hydrologists, landscape planners, economists, engineers, and public and private agencies and organizations involved in managing wetlands. SCS will determine relationships between kinds of soils and types of wetlands and wetland vegetation.

Urban-to-Rural Migration

Rural areas and small towns in the Nation grew by 3.6 million people, a 6.6-percent increase in the 5-year period 1970–75.

The trend toward increasing urban-to-rural migration was first noted in the 1970–72 period by the USDA's Economic Research Service (ERS), which analyzes county population estimates compiled by the Census Bureau.

Reversing the massive rural-to-urban migration that began with World War II and continued through the 1960's, the urban-to-rural migration, which is also occurring in other developed nations, is likely to continue in the United States at least into the 1980's.

ERS Demographer Calvin Beale, who prepared the latest 5-year-population analysis, reported that the move to rural areas is not a back-to-the-farm movement. The farm population declined by about 850,000 or 8.7 percent in the 5-year period, although significant additional losses in farm employment have ended.

About half the migration to nonmetropolitan counties from 1970–74 was to counties that had retirement areas. It was the fastest growing group of nonmetropolitan counties in that period. They had a net gain of 932 000 people or a 14.5-percent increase, triple the national average.

Beale says economics and attitudes are causing people to move to nonmetropolitan areas, where employment has increased faster than in metropolitan areas in every major industry except government. A narrowing gap between the quality of life in urban and rural areas is another reason people are moving to rural areas, along with the association of large cities with crime, pollution, and high prices.

Beale notes that gasoline costs and supplies could change the current trend. "Rural people use considerably more gasoline per capita and have fewer public transportation alternatives during an emergency," he points out.

Severe Wind Erosion Hits Plains

Not since the mid-1950's have wind and dry weather joined forces to damage as much land—nearly 8 million acres.

Nearly 8 million acres in the Great Plains were damaged by wind during the 1976-1977 erosion season—the most extensive damage since the drought of the 1950's.

Soil Conservation Service field reports from 346 counties showed 7,992,802 acres damaged from November through May, up from the 6,165,335 acres damaged during the same period a year ago.

Colorado was hardest hit: wind severely eroded 2,520,300 acres compared to 739,750 acres damaged at this time last year.

Other States reporting more erosion than last year were Texas, 2,192,173 acres damaged compared to 1,572,079 acres the previous year; North Dakota, 791,805 acres compared to 296,700; New Mexico, 597,550 acres compared to 288,275; South Dakota, 692,621 acres compared to 463,549; and Nebraska, 396,260 acres compared to 348,343.

States reporting less erosion than a year ago are Montana, with 266,623 acres damaged compared to 903,454 acres the previous year; Kansas, 315,450 acres compared to 907,288; Oklahoma, with 206,840 acres compared to 619,867; and Wyoming, with 13,180 acres compared to 26,030.

About 80 percent of the damage in the 10-State area was to cropland. SCS considers land as damaged if enough soil has been removed or deposited to subject the land to further erosion hazard or to impair its capacity to produce.

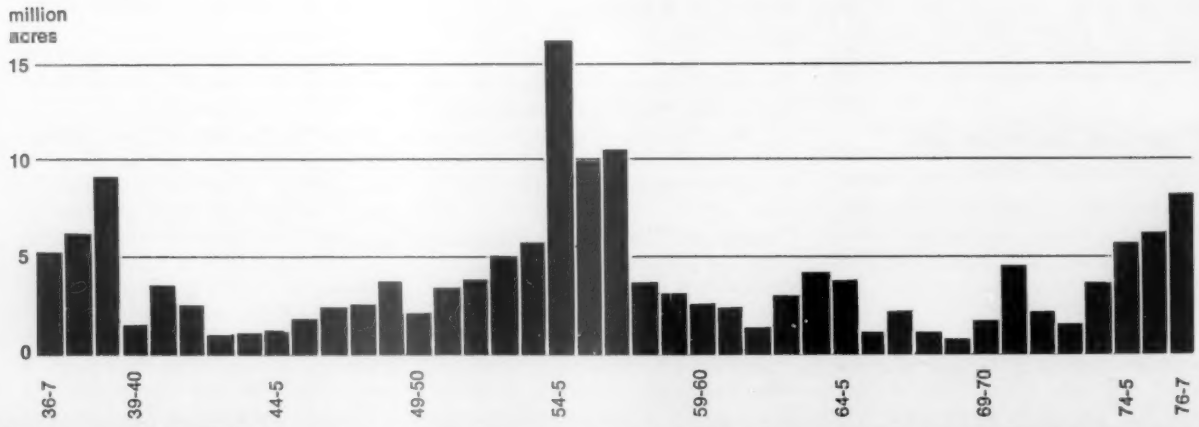
Emergency tillage to prevent land damage was reported in every Plains State, with more than 3.5 million acres treated.

Contributing to the increased wind erosion this year were frequent, long windstorms, inadequate crop residue cover, excessive tillage, and inadequate soil moisture. Erosion damage in the Plains is greatest from November through May, when high winds are most frequent. There also is less protective cover on the soil and usually less precipitation.

SCS has kept statistics on Great Plains wind erosion damage since 1935, except for a 10-year period beginning in 1943 when figures were compiled by the Great Plains Agricultural Council.

Acres of Land Damaged Annually in Great Plains

Seasons 1936-37 to 1976-77



Beaver Dams Help Peanut Farmers

by F. Dwain Phillips
and John I. Upton

Beaver dams are a vital component of an irrigation system developed by a half-dozen farmers in Hughes County, Okla. The system supplies water to more than 400 acres of peanuts, which could not be grown there without irrigation.

Joe and Kelly Pace, Earl and Jim Shaw, Grant Osborn, and Paul Dean are cooperators with the Hughes County Conservation District. They work together closely, sharing equipment, labor, and irrigation water from a lake built in the Big Wewoka Creek watershed under the Soil Conservation Service's small watershed program.

The farmers release water from the lake by opening a small gate in the principal spillway in front of the dam. The water travels through a pipe beneath the dam into the creek below. It is picked up downstream by irrigation pumps and spread on the crops by sprinklers.

The farmers needed small pools in the creek in which to put inlet pipes for their irrigation pumps. That's where the beavers helped out.

The men first tried to construct dams across the creek using old railroad crossties and boards; but each time it rained, the dams washed out.

Beavers also had built a series of 4-foot-high dams across the same creek. Their dams, however, can withstand the rushing water with very little damage—and if they are damaged, beavers quickly repair them. The small pools formed by the beaver dams proved ideal for the farmers' inlet pipes.

Mr. Phillips is public information officer, SCS, Stillwater, Okla.
Mr. Upton is district conservationist, SCS, Holdenville, Okla.

Meetings:

August	
7–10	Soil Conservation Society of America, Richmond, Va.
15–18	National Farm and Power Equipment Dealers Association, St. Louis, Mo.
17–19	Highway Geology Symposium, Rapid City, S. Dak.
21–26	American Institute of Biological Sciences, East Lansing, Mich.
September	
6–9	Hardwood Plywood Manufacturers Association, Seattle, Wash.
13–16	Editorial Writers Conference, Calgary, Alta., Canada
19–22	North American Forest Lands at Latitudes North of 60° Symposium, Fairbanks, Alaska
25–28	American Society of Landscape Architects, Minneapolis, Minn.
24–27	Farm and Industrial Equipment Institute Convention, Hot Springs, Va.
25–29	International Grain and Forage Harvesting Conference, Ames, Iowa
28	Clean Community System National Seminar, Keep America Beautiful, Inc., Washington, D.C.
October	
2–6	Congress for Recreation and Parks, Las Vegas, Nev.
2–7	Water Pollution Control Federation Conference, Philadelphia, Pa.
8–12	American Institute of Planners Conference, Kansas City, Mo.
14–20	National Environmental Sanitation and Maintenance Educational Conference, Exposition, Lake Buena Vista, Fla.
15–19	American Bankers Association, Houston, Tex.
16–19	American Forestry Association, Monterey, Calif.
20–23	National Association of Biology Teachers, Inc., Anaheim, Calif.
27–28	American Association for Vocational Instructional Material, Fargo, N. Dak.
31–Nov. 2	American Association of State Highway and Transportation Officials, Atlantic City, N.J.

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